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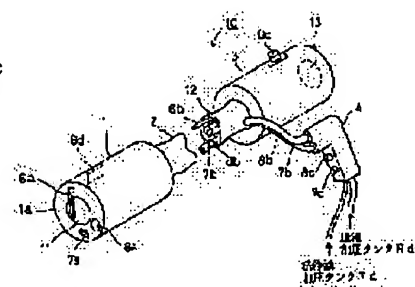
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(54) IMAGE SCOPE

(57)Abstract:

PURPOSE: To provide an image scope where an objective lens is not stained.

CONSTITUTION: This image scope 10 is constituted of an objective lens casing 1, a flexible tube 2, an ocular casing 3, a grip body 4, a washing liquid pressurizing tank 7d and a liquid sending pressurizing tank 8d. The objective lens 11 is fitted on the front side of the lens casing 1 and a wiper 6a capable of wiping out the outer surface of the lens 11 is provided near the lens 11 on an end face 1a. Then, a washing liquid discharge opening 7a and a jet 8a are similarly provided on the end face 1a. By turning on a wiper switch 6c, the wiper 6a wipes out the outer surface of the lens 11.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the image scope which connected between an objective lens and the lenses for observation by the optical fiber bundle.

[0002]

[Description of the Prior Art] With the image scope, between an objective lens and the lenses for observation is connected by the optical fiber bundle, and this optical fiber bundle is usually covered with the flexible tube.

[0003] As shown in drawing 5 (a) and (b) as this image scope Change the objective lens 106 for receiving the light guide 107 for leading the light from the light source to a nose-of-cam side, and the lighting reflected light, and acquiring a light figure, and this light figure into an electrical signal in CCD, and the electrical signal is made into a picture. The display 103 to output and the image scope 100 which consisted of a supplied air, a supplied air, a water supply tube 108,109 for supplying water, etc. at the nose-of-cam side are indicated by JP,3-286733,A.

[0004] This image scope 100 can be used when inspecting the coelome of the place, for example, human being, which direct human being cannot check by looking etc. That is, an operator can observe the interior of a coelome through a display 103 by introducing the objective lens 106 side of the image scope 100 in human being's coelome.

[0005]

[Problem(s) to be Solved by the Invention] When the place where sewage, a sordes, or dust exists, for example like a sewerage pipe, and the conventional image scope 100 are used for the place where body fluid etc. exists like human being's coelome, the picture which sewage etc. adhered on the surface of the objective lens, and was carried out clearly might not be acquired, and nothing may stop however, having seen. When this situation occurred, the operator once had to take out the objective lens 106 side of the image scope 100 from the pipe etc., had to clean the objective lens 106, had to introduce the objective lens side into the pipe etc. again, and had required time complicated [work] and useless.

[0006] Since there was a possibility that an objective lens 106 may be polluted with the liquid which oneself injected when a liquid is injected from the water supply tube 109 and washing etc. carries out a coelome wall especially, it was easy to cause generating of the above-mentioned situation. this invention is made in view of the above-mentioned technical problem, and it aims at offering the image scope on which an objective lens does not become dirty.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 is characterized by preparing the wiper which wipes off this objective lens near the aforementioned objective lens in the image scope which connected between an objective lens and the lenses for observation by the optical fiber bundle.

[0008] It is characterized by invention according to claim 2 preparing the penetrant remover delivery which is an image scope according to claim 1, and carries out the regurgitation of the penetrant remover toward this objective lens near the aforementioned objective lens. Invention according to claim 3 is characterized by having the stowage which contains the aforementioned objective lens, and the shutter which can be opened and closed and which was installed in the front side of the aforementioned objective lens among the aforementioned stowages in the image scope which connected between an objective lens and the lenses for observation by the optical fiber bundle.

[0009] invention according to claim 4 -- a claim -- it is the image scope of a publication one to 3 either, and is characterized by having the injection tip prepared in the aforementioned objective lens side, the feeder which supplies a fluid to the aforementioned injection tip, and the injection control section which controls injection of the fluid from the aforementioned injection tip

[0010] In addition, a fluid means fluids, such as a gas, a liquid, and a powder-like object, etc. Moreover, the lens for observation means the CCD camera for expressing as the ocular and picture for observing with the naked eye etc.

[0011]

[Function and Effect(s) of the Invention] According to the image scope according to claim 1, the affix can be easily wiped off with the wiper prepared near the objective lens side though body fluid, such as dust, sewage, and a sordes, etc. adhered to the objective lens. Therefore, an objective lens does not become dirty. For this reason, the time and effort to which an operator cleans an objective lens like before does not enter, and useless time is not consumed.

[0012] According to the image scope according to claim 2, only by wiping with a wiper, when an affix is easily unremovable, a penetrant remover is breathed out toward an objective lens from a penetrant remover delivery, and a wiper wipes off and removes

an affix with a penetrant remover. Therefore, compared with a claim 1, the affix of an objective lens can be removed still more easily.

[0013] When introducing an objective lens into a place with a possibility that body fluid, such as dust, sewage, and a sordes, etc. may adhere to an objective lens according to the image scope according to claim 3, a shutter is closed first. Since an objective lens will be in the state where it was sealed in the stowage by the shutter, at this time, contact outside is intercepted. And after introducing an objective lens to a predetermined position, a shutter is opened wide, and the state of the position is checked through the lens for observation. Thus, an objective lens does not become dirty in order that an objective lens may not contact the exterior other than the time of the need.

[0014] When using for a sewerage pipe, for example, after checking a position according to the image scope according to claim 4, an injection control section is controlled and fluids, such as air from a feeder, a penetrant remover, and insect killing, a germicide, are injected from an injection tip. If a fluid is injected at this time, moving a wiper with an image scope according to claim 1 or 2, an objective lens will not become dirty with a fluid. Moreover, from an image scope according to claim 3, if a fluid is injected where a shutter is closed, an objective lens will not become dirty with a fluid.

[0015]

[Example] The suitable example of this invention is explained below based on a drawing. Drawing 1 is the perspective diagram of the 1st example. The image scope 10 of the 1st example mainly consists of the objective lens casing 1, a flexible tube 2, the ocular casing 3, a grip object 4, 7d of penetrant remover pressure tanks, and 8d of liquid-sending pressure tanks.

[0016] As for the objective lens casing 1, the objective lens 11 is inserted in the front side. The cavity of a cylindrical shape is formed and, as for the interior of the objective lens casing 1, the point of the image fiber 12 is arranged in the objective lens 11 and the position where it counters at this cavity. It is end-face 1a of the objective lens casing 1, and wiper 6a which can wipe off the outside surface of an objective lens 11 is prepared near the objective lens 11. This wiper 6a is driven by motor 6d installed in the objective lens casing 1.

[0017] It is end-face 1a of the objective lens casing 1, and penetrant remover delivery 7a is prepared in the attaching position of wiper 6a, and the position which counters. The discharge direction of this penetrant remover delivery 7a is going to the outside surface of an objective lens 11. Injection-tip 8a is further prepared in end-face 1a of the objective lens casing 1. The injection direction of this injection-tip 8a is going ahead [perpendicular] from end-face 1a of the objective lens casing 1.

[0018] The flexible tube 2 has covered the image fiber 12, cable 6b, penetrant remover tube 7b, and liquid-sending tube 8b. The image fiber 12 is the bunch of the plastics fiber as an optical fiber. The end of the image fiber 12 is arranged in the position which counters an objective lens 11, as mentioned above, and the other end is arranged in the position which counters an ocular 13. In addition, the plastics fiber was adopted because there was no possibility that it may be cut even if repeat incurvation is carried out, since the glass fiber was excelled in flexibility.

[0019] The nose of cam of penetrant remover tube 7b is connected with penetrant remover delivery 7a, and the nose of cam of liquid-sending tube 8b is connected with injection-tip 8a. Moreover, the nose of cam of cable 6b is connected to motor 6d which drives wiper 6a. As for the ocular casing 3, the ocular 13 is inserted in the back end side. The cavity of a cylindrical shape is formed and the interior of the ocular casing 3 is arranged in the position where the back end section of the image fiber 12 counters this cavity with an ocular 13 as mentioned above.

[0020] Windshield-wiper-switch 6c is prepared in the outside surface of the ocular casing 3. Windshield-wiper-switch 6c is prepared between cable 6b and the small battery which is not illustrated, and controls the motor 6d energization state of driving wiper 6a. Penetrant remover switch 7c and liquid-sending switch 8c are prepared in the grip object 4. Penetrant remover switch 7c is an opening-and-closing valve which is prepared between penetrant remover tube 7b and 7d of penetrant remover pressure tanks, and controls the supply state of the penetrant remover from 7d of penetrant remover pressure tanks to penetrant remover tube 7b. On the other hand, liquid-sending switch 8c is an opening-and-closing valve which is prepared between 8d of liquid-sending pressure tanks in which liquid-sending tube 8b, and sterilization and an insecticide were built, and controls the supply state of liquid sending to liquid-sending tube 8b from 8d of liquid-sending pressure tanks. In addition, 8d of liquid-sending pressure tanks is equivalent to the feeder of this invention, and liquid-sending switch 8c is equivalent to an injection control section.

[0021] About the operation effect of the image scope 10 of the 1st example of the above, the case where the interior of a long and slender sewerage pipe is inspected is mentioned as an example, and is explained. An operator introduces an objective lens 11 side into a long and slender pipe. An objective lens 11 is introduced inside a pipe, sending in a flexible tube 2 by hand at this time. Although an operator observes the interior of a pipe through an ocular 13, when the picture which dust, sewage, a sordes, etc. adhere to an objective lens 11 at this time, and is projected through an ocular 13 becomes less clear, windshield-wiper-switch 6c is turned on. Then, wiper 6a drives by motor 6d, the front face of an objective lens 11 is wiped off, and an affix is removed. On the other hand, only by wiper 6a, when an affix cannot remove easily, penetrant remover switch 7c is turned on further. Then, a penetrant remover is breathed out from penetrant remover delivery 7a to an objective lens 11. For this reason, an affix is wiped off by wiper 6a with a penetrant remover, and is removed easily.

[0022] Therefore, the time and effort to which an operator cleans an objective lens 11 like before does not enter, and useless time is not consumed. Moreover, as a result of observing the interior of a pipe, when the propagation part of a fungus or an insect is discovered, an operator turns ON windshield-wiper-switch 6c first, and makes wiper 6a drive. Next, liquid-sending switch 8c is turned on, checking the aforementioned propagation part with an ocular 13. Then, the sterilization and the insecticide built in 8d of liquid-sending pressure tanks are injected from injection-tip 8a to the propagation part. Since the objective lens 11 is

continuously wiped off by wiper 6a at this time, an objective lens 11 does not become dirty by the sterilization and the insecticide which oneself injected. Therefore, an operator can check clearly whether sterilization and the insecticide have hit the aforementioned propagation part certainly through an ocular 13.

[0023] Next, the 2nd example is explained. Drawing 2 is the perspective diagram of the 2nd example. The image scope 20 of the 2nd example is not equipped with penetrant remover delivery 7a of the 1st example, penetrant remover tube 7b, penetrant remover switch 7c, and 7d of penetrant remover pressure tanks. Moreover, it has shutter 26a, cable 26b, and shutter switch 26c instead of wiper 6a of the 1st example, cable 6b, and windshield-wiper-switch 6c. Except for the above point, since the 2nd example is the same as the 1st example, about the same component, the same sign shows it, and it omits the explanation.

[0024] Shutter 26a is the end-face 1a side of the objective lens casing 1, and it is prepared so that an objective lens 11 can be covered ahead [of an objective lens 11]. The opening-and-closing operation of this shutter 26a is carried out by motor 26d installed in the objective lens casing 1.

[0025] Shutter switch 26c is prepared in the outside surface of the ocular casing 3. Shutter switch 26c is prepared between cable 26b and the small battery which is not illustrated, and controls a motor 26d energization state. About the operation effect of the image scope 20 of the 2nd example of the above, the case where the interior of a long and slender sewerage pipe is inspected is mentioned as an example, and is explained.

[0026] An operator turns on shutter switch 26c first, and closes shutter 26a. Then, an objective lens 11 will be in the state where it was sealed by shutter 26a in the objective lens casing 1, and contact outside will be intercepted. An objective lens 11 side is introduced into a long and slender pipe in this state. That is, an objective lens 11 is introduced to a predetermined position, sending in a flexible tube 2 by hand. Then, shutter switch 26c is turned off, shutter 26a is opened wide, and the state of the position is checked through an ocular 13. In addition, the check of whether the objective lens 11 arrived at the predetermined position is performed by turning off shutter switch 26c at any time, and opening shutter 26a.

[0027] Thus, in order that an objective lens 11 may not contact the exterior other than the time of the need, an objective lens 11 does not become dirty. Therefore, the time and effort to which an operator cleans an objective lens 11 like before does not enter, and useless time is not consumed. Moreover, as a result of observing the interior of a pipe, when the propagation part of a fungus or an insect is discovered, after he checks the aforementioned propagation part with an ocular 13, an operator turns on shutter switch 26c, closes shutter 26a and, subsequently turns on liquid-sending switch 8c. Then, the sterilization and the insecticide built in 8d of liquid-sending pressure tanks are injected from injection-tip 8a to the propagation part. Since it is in the state where the objective lens 11 was sealed in the objective lens casing 1 at this time, an objective lens 11 does not become dirty by the sterilization and the insecticide which oneself injected. Then, shutter switch 26c is turned off, shutter 26a is opened wide, and the follow up of sterilization and the insecticide having hit the aforementioned propagation part certainly can be carried out.

[0028] In addition, this invention cannot be overemphasized by that it can carry out in various modes unless it deviates from the technical range of this invention, without being limited to the above-mentioned example in any way. For example, as shown in drawing 3, it is good also as composition which make objective lens casing 1 of the 1st example into the double-pipe structure which consists of outer-tube 1b and inner-tube 1c, and space 8e surrounded by outer-tube 1b and inner-tube 1c is made to open liquid-sending tube 8b for free passage, and injects a liquid from injection-tip 8a through space 8e. Or as shown in drawing 4, it is good also as composition which arrange 1d of barrels which only the back end section closed on the outside of the objective lens casing 1, and the back end section of 1d of barrels is made to open liquid-sending tube 8b for free passage, and injects a liquid from doughnut-like injection-tip 8a through 8f of end-face 1a of the objective lens casing 1, and 1d [of barrels] gaps. With the composition of drawing 4, it reaches far and wide rather than drawing 3, and a liquid can be injected. On the other hand, with the composition of drawing 3, a liquid can be injected with vigor more sufficient than drawing 4.

[0029] Moreover, a floodlight may be formed in the objective lens casing 1 of each above-mentioned example, and an operator can recognize a photographic subject clearly through an ocular 13 in this case by the light of a floodlight. Furthermore, it may replace with the ocular casing 3 and the display (refer to drawing 5) which changes an image into an electrical signal in CCD like the conventional example, and outputs the electrical signal as a picture may be connected.

[0030] Furthermore, it may replace with liquid-sending tube 8b and 8d of liquid-sending pressure tanks, and a supplied-air tube and an air compressor may be used again. In this case, although there is no possibility that an objective lens may become dirty with the liquid itself injected since a liquid was not injected from injection-tip 8a, since it has a possibility of becoming dirty by surrounding dust, surrounding sewage, etc., it has the utility value of wiper 6a or shutter 26a at this point.

[0031] In addition, when using the above-mentioned image scopes 10 and 20 for the inspection in human being's coelome, for example, you may make the medical fluid which made the therapeutic drug dissolve and suspend build in 8d of liquid-sending pressure tanks.

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CLAIMS

[Claim(s)]

[Claim 1] The image scope characterized by preparing the wiper which wipes off this objective lens near the aforementioned objective lens in the image scope which connected between an objective lens and the lenses for observation by the optical fiber bundle.

[Claim 2] The image scope according to claim 1 characterized by preparing the penetrant remover delivery which carries out the regurgitation of the penetrant remover toward this objective lens near the aforementioned objective lens.

[Claim 3] The image scope characterized by having the shutter which can be opened and closed, and which was installed in the front side of the aforementioned objective lens among the stowage which contains the aforementioned objective lens, and the aforementioned stowage in the image scope which connected between an objective lens and the lenses for observation by the optical fiber bundle.

[Claim 4] the claims 1-3 characterized by having the injection tip prepared in the aforementioned objective lens side, the feeder which supplies a fluid to the aforementioned injection tip, and the injection control section which controls injection of the fluid from the aforementioned injection tip -- either -- the image scope of a publication

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram of the 1st example.

[Drawing 2] It is the perspective diagram of the 2nd example.

[Drawing 3] It is the partial perspective diagram of other examples.

[Drawing 4] It is the partial perspective diagram of other examples.

[Drawing 5] It is explanatory drawing of the conventional example, and drawing 5 (a) is general drawing and drawing 5 (b) is the A-A cross section of drawing 5 (a).

[Description of Notations]

1 ... Objective lens casing 2 [4 / 7a / 8c / 10 20 / 12 / 26a ... Shutter / ... An image fiber 13 ... Ocular / ... An image scope, 11 ... Objective lens / ... A liquid-sending switch, 8d ... Liquid-sending pressure tank / ... A penetrant remover delivery, 8a ... Injection tip / ... A grip object 6a ... Wiper] ... A flexible tube, 3 ... Ocular casing

[Translation done.]

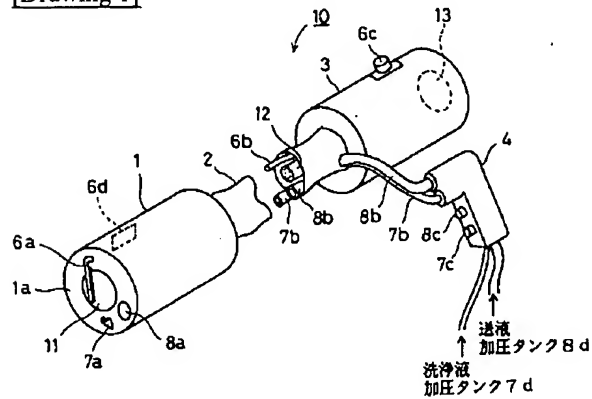
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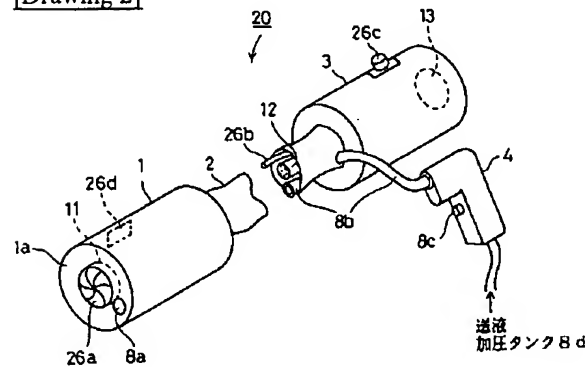
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DRAWINGS

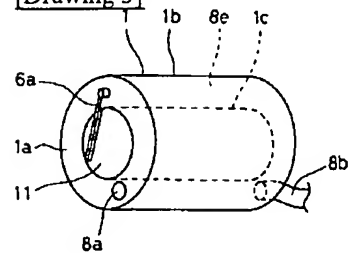
[Drawing 1]



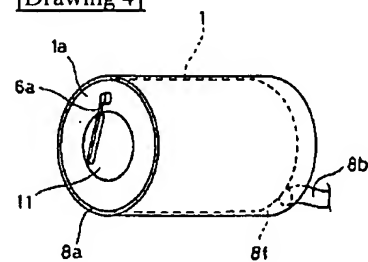
[Drawing 2]



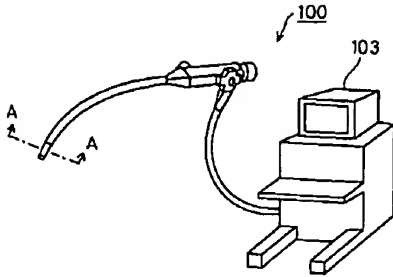
[Drawing 3]



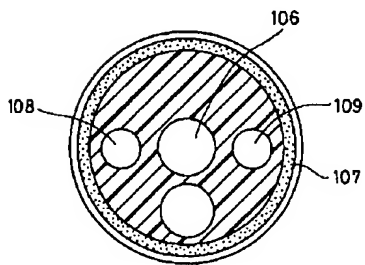
[Drawing 4]



[Drawing 5]
(a)



(b)



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